

OPERATING SUMMARY

NORTH BAY

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Ontario

Ministry of the
Environment

135 St. Clair Avenue West

Toronto 195, Ontario

We are pleased to present you with the 1972 operating summary for the water pollution control plant serving your community.

This summary contains data on the performance of the plant as well as relevant financial information. Of particular interest is the review of the year's activities in which significant items of these data are discussed in some detail by the operations engineer and his staff who, by their day-to-day involvement with the operation, are thoroughly familiar with the plant.

We appreciate your continuing interest in protecting the environment through the efficient operation of this wastewater treatment facility.

D.S. Caverly,
Assistant Deputy Minister.

D.A. McTavish, P. Eng.,
Director,
Project Operations Branch.

MINISTRY OF THE ENVIRONMENT

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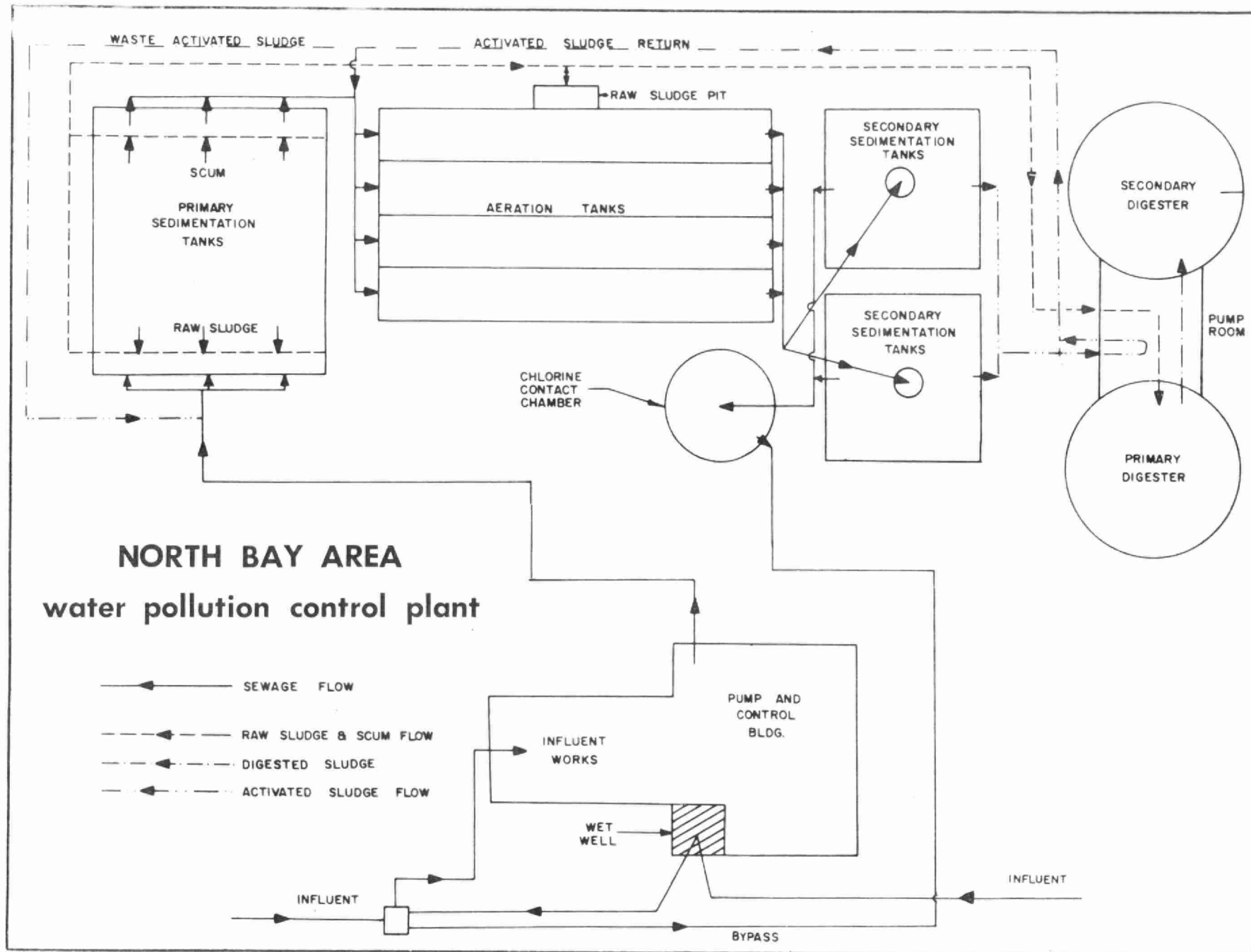
NORTH BAY
WATER POLLUTION CONTROL PLANT

operated for
THE CITY OF NORTH BAY
by the
MINISTRY OF THE ENVIRONMENT

1972 ANNUAL OPERATING SUMMARY

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DESIGN DATA

PROJECT NO. 2-0010-58

TREATMENT Activated Sludge

DESIGN FLOW 4.0 mgd

DESIGN POPULATION 50,000

BOD - Raw Sewage 150 mg/l
- Removal 85%

PRIMARY TREATMENT

Grit Removal

Type: Walker CRG
Size: Two $11\frac{1}{2}$ X $11\frac{1}{2}$ X 2' (3,300 gal)
Retention: 1.2 min
Flow Velocity: 0.163 fps

Comminution

- Two Griductors (Infilco)

Sewage Lift Pumps

Type: Chicago Pumps
Size: Two 4 mgd (gas)
One 4 mgd (electric)

Primary Sedimentation

Type: Hardinge
Size: Three 90 X 30 X 10'
(0.505 mil gal)
Retention: 3 hr
Loading: Surface, 500 gal/ft²/day
Weir, 44,000 gal/ft/day

SECONDARY TREATMENT

Aeration Tanks

Type: Diffused air, single-pass
Size: Four 185 X 20 X 12'
(1.1 mil gal)
Retention: 6.4 hr
Loading: 4,200 lb BOD/day

Air Supply

Type: Roots
Size: Two 3750 cfm @ 7 psi

Diffusers

Type: Spargers
Spacing: 70 @ $22\frac{1}{2}$ "
14 @ $155/8$ " per tank
32 @ $13\frac{1}{2}$ "

Secondary Sedimentation

Type: Walker RSX
Size: Two 60 X 60 X 11' (500,000 gal)
Retention: 3 hrs
Loading: Surface, 550 gal/ft²/day
Weir, 8,000 gal/ft/day

CHLORINATION

Type: BIF semi-automatic
Size: One 500 lb/day

Chlorine Contact Chamber

Size: One 34' dia x $12\frac{1}{2}$ ' (71,000 gal)
Retention: 25 min

OUTFALL

- 1000 ft into Lake Nipissing

SLUDGE HANDLING

Digestion System - Two-stage

Primary --

Type: Dorr (3 draft tube mixers)
Size: One 65' dia (70,000 cu ft or
0.436 mil gal)
Loading: 2.4 lb/cu ft/mo

Secondary --

Size: One 65' dia (74,000 cu ft or
0.46 mil gal)
Total Loading: 1.2 lb/cu ft/mo

'72 Review

GENERAL

The North Bay sewerage system consists of a 4.0 mgd secondary treatment plant, collector sewers and approximately 20 pumping stations of which the plant, some sewers and five pumping stations are financed by the Ministry of the Environment. A plant staff of eight members operate these facilities and in addition provide emergency service and electrical maintenance to the city-owned pumping stations.

Plant efficiency with respect to BOD and suspended solids removals improved by 8 percent and 12 percent over the previous year. This is attributed to the additional air supply provided by the second blower and improved laboratory control brought about by hiring on full time a lab technician in December 1971.

A phosphorus removal study was carried out for a period of three months to determine the type of chemicals and dosage required when phosphorus removal treatment is implemented in 1974.

Expansion of the plant treatment facility from 4.0 to 8.0 mgd is well underway and it is anticipated will be completed by April 1974. The expanded plant will be of the modified activated sludge type with conventional primary and secondary clarification conventional anaerobic digestion and high rate aeration. Phosphorus removal treatment will also be provided in the expanded plant.

EXPENDITURES

The total operating cost was \$184,876.59. Approximately \$4,700 spent on a phosphorus removal study early in the year is to be reimbursed in 1973 and credited to the operating account.

PLANT FLOW AND CHLORINATION

A total flow of 1,863 million gallons was treated in 1972 which represents an average daily flow of 5.1 mgd and compares with 5.1 mgd in 1971 and 5.4 mgd in 1970.

The average daily flows exceeded the design capacity of 4.0 mgd 90 percent of the time during the year, 5.0 mgd 45 percent of the time and 6.0 mgd 20 percent of the time.

During the high flow periods an undetermined amount of flow bypasses the plant automatically at a manhole directly upstream of the influent works. Bypassing occurs when the flow rate to the plant exceeds 7.0 mgd.

PLANT EFFICIENCY

The average raw sewage strength of 138 mg/l BOD represented a 26 percent decrease from the previous year. The suspended solids concentration of 265 mg/l represented an increase of 35 percent over the previous year.

The final effluent BOD and suspended solids concentrations of 26 mg/l and 38 mg/l respectively are improvements over 1971 values. This is attributed primarily to the use of a second blower when required and better lab control.

The average BOD and suspended solids reductions were respectively 81 percent and 86 percent.

AERATION

The average BOD loading of 109 mg/l to the aeration section was approximately 20 percent less than 1971. The MLSS concentration was increased from an average of 1420 mg/l in 1971 to 2000 mg/l. This in turn allowed the F/M ratio to be reduced from 0.5 in 1971 to the more desirable level of 0.25 in 1972.

SLUDGE DIGESTION AND DISPOSAL

A total of 9,240,000 gallons of raw sludge was pumped to the primary digester at an average concentration of 4.6 percent total solids. Digestion reduced the total quantity to 5,560,000 and a total solids concentration of 4.5 percent. The digested sludge was removed from the plant by tank truck.

CONCLUSIONS

The plant efficiency improved over the previous year and is attributed to better laboratory control and additional air supply for the aeration process.

A phosphorus removal study was carried out to determine the type of chemicals and dosages suitable for phosphorus removal treatment which will begin in 1974.

It is anticipated that the plant expansion program will be completed by April, 1974.

PROJECT COSTS

NET CAPITAL COST	\$2,364,004.73
DEDUCT - Portion financed by	
Municipal Advances	<u>(50,000.00)</u>
Long Term Debt to MOE	<u>\$2,314,004.73</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1972	\$ <u>777,301.67</u>
Net Operating	\$ 184,876.59
Debt Retirement	16,996.00
Reserve	7,887.60
Interest Charged	<u>129,766.98</u>
TOTAL	\$ <u>339,527.17</u>

RESERVE ACCOUNT

Balance @ January 1, 1972	\$ 170,314.45
Deposited by Municipality	7,887.60
Interest Earned	<u>11,120.69</u>
	\$ 189,322.74
Less Expenditures	<u>(531.30)</u>
Balance @ December 31, 1972	\$ <u>189,854.04</u>

1972 COSTS

OPERATING COSTS

• PAYROLL	42 %
• FUEL	3 %
• POWER	14 %
• CHEMICALS	5 %
• GENERAL SUPPLIES	4 %
• EQUIPMENT	1 %
• REPAIRS & MAINTENANCE	6 %
• SUNDRY	20 %
• WATER	4 %
• TRAVEL	<1 %

TOTAL ANNUAL COST

• NET OPERATING	55 %
• DEBT RETIREMENT	5 %
• RESERVE	2 %
• INTEREST	38 %

YEARLY OPERATING COSTS

YEAR	SEWAGE TREATED in million gallons	TOTAL OPERATING COSTS	TREATMENT COSTS	
			\$ per million gal	¢ per lb BOD
1968	1545.4	106,231.28	68.74	4 cents
1969	1777.2	121,522.69	68.38	7 cents
1970	1957.	139,983.43	71.52	7 cents
1971	1863.	157,916.82	84.90	5 cents
1972	1865.	184,876.59	99.10	9 cents

MONTHLY OPERATING COSTS

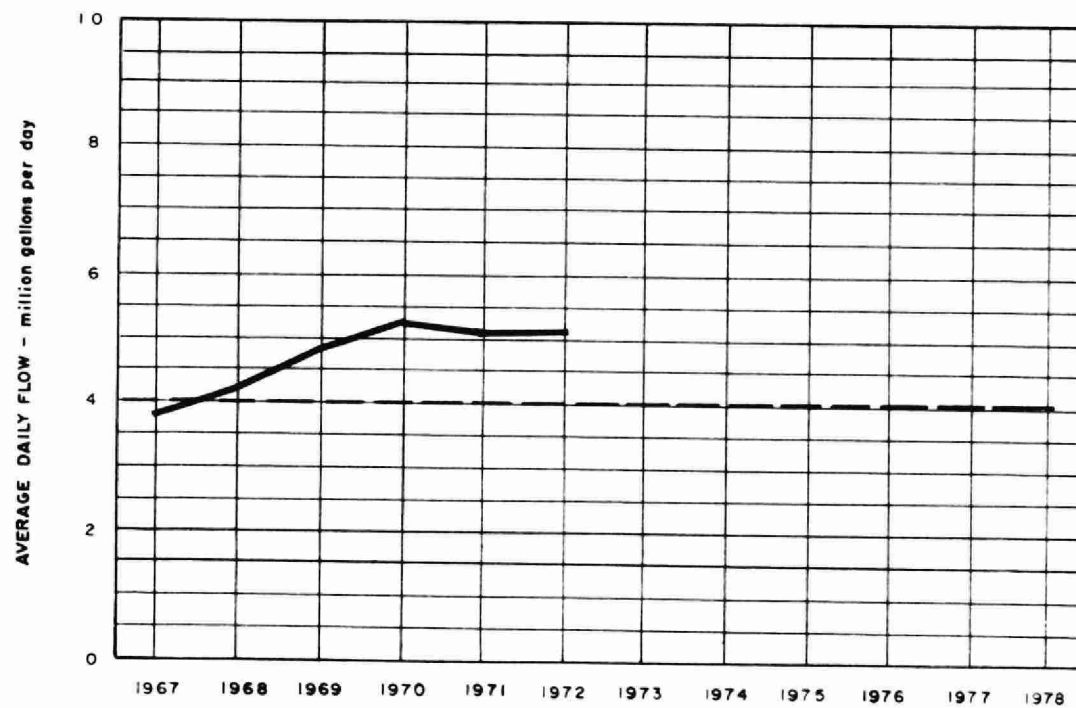
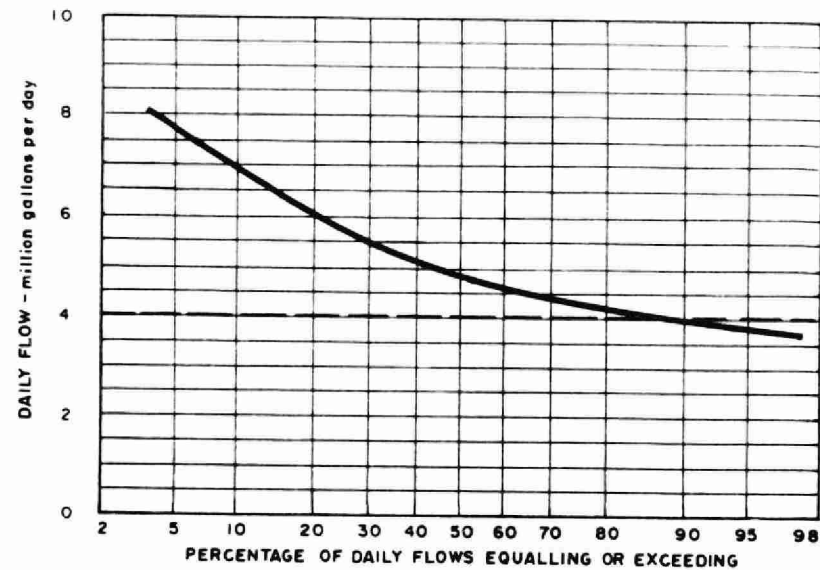
MONTH	TOTAL EXPENDITURE	REGULAR PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICALS	GENERAL SUPPLIES	EQUIPMENT	REPAIRS and MAINTENANCE	SUNDRY*	WATER	TRAVEL
JAN	9513.89	4470.51	420.64		2054.51		209.01		491.58	1867.64		
FEB	22318.20	5313.72	444.36	632.49	2125.93	8080.29	683.82	95.88	976.05	3373.96	591.70	
MAR	17349.60	5382.00	516.37	589.79	1919.21	925.54	684.39	110.59	702.24	5725.64	651.38	142.45
APR	15898.24	5457.97	207.86	555.62	2028.00		734.70	511.19	357.63	4658.15	1387.12	
MAY	11342.55	5849.54	310.95	526.18	2295.42	(2089.52)	1466.07	135.14	1364.71	1378.13	105.93	
JUNE	16582.30	8012.15	539.93	471.83	2264.82	121.60	672.92	175.11	620.58	2291.14	1533.40	(121.18)
JULY	5372.27	144.07		425.75	2031.24		416.41		795.49	1438.13		121.18
AUG	9798.10	5592.11		508.67	2123.99		587.18	83.95	181.23	46.66	674.31	
SEPT	12640.48	5955.28	487.19	491.97	2397.06	92.00	165.05		525.13	1736.33	790.47	
OCT	14555.04	6849.26		414.44	2122.13	33.60	218.14	175.83	574.02	4167.62		
NOV	14600.20	39.20		516.14	2641.29	1490.48	278.68	513.45	1326.02	6965.63	829.31	
DEC	34905.72	21785.64		567.56	2495.99	1586.20	1214.65	102.75	3309.94	2910.68	655.59	276.72
TOTAL	184876.59	74851.45	2927.30	5700.44	26499.59	10240.19	7331.02	1903.89	11224.62	36559.71	7219.21	419.17

Brackets indicate credit.

* Sundry includes sludge haulage costs of \$30,174.90

PROCESS DATA

FLOWS

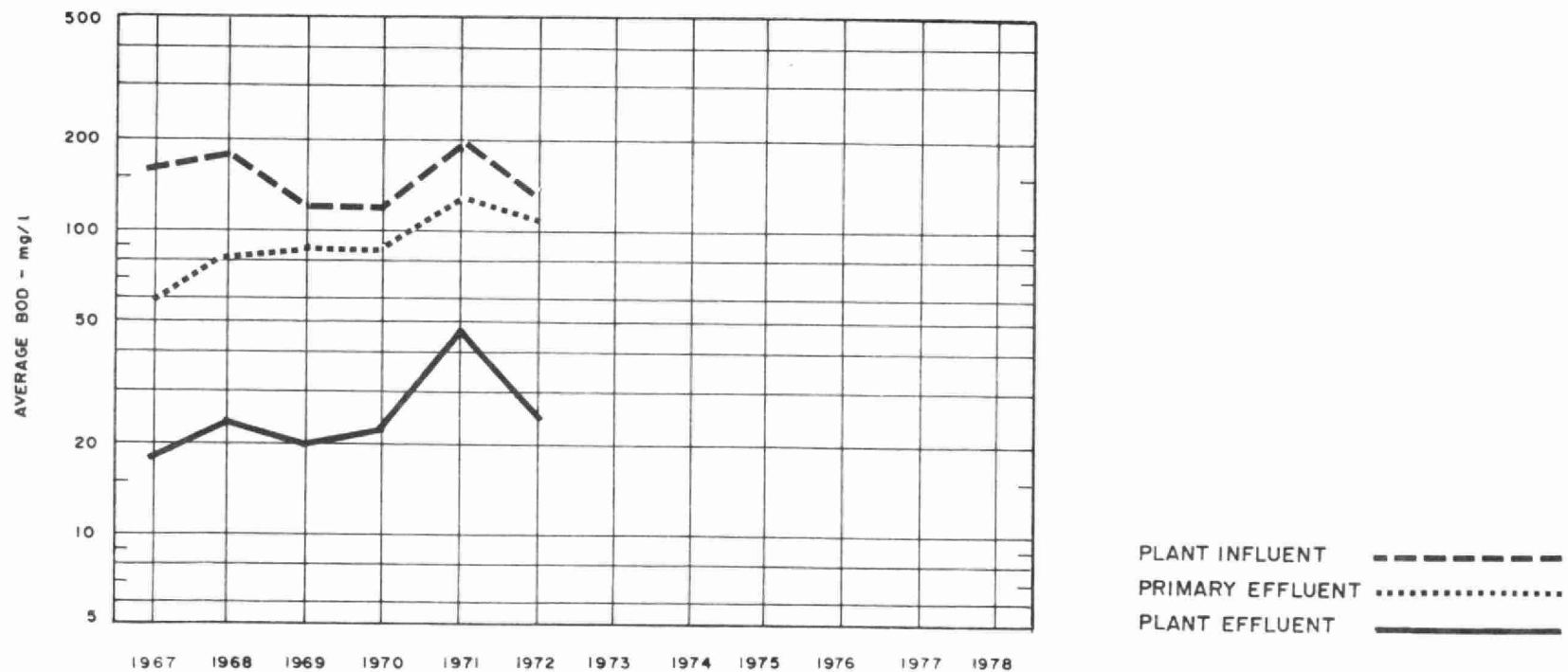
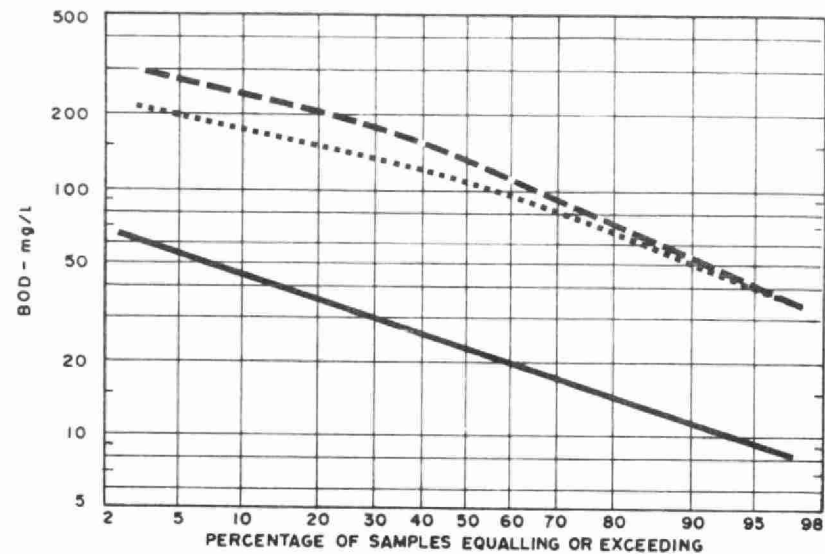


DESIGN CAPACITY - - - - -

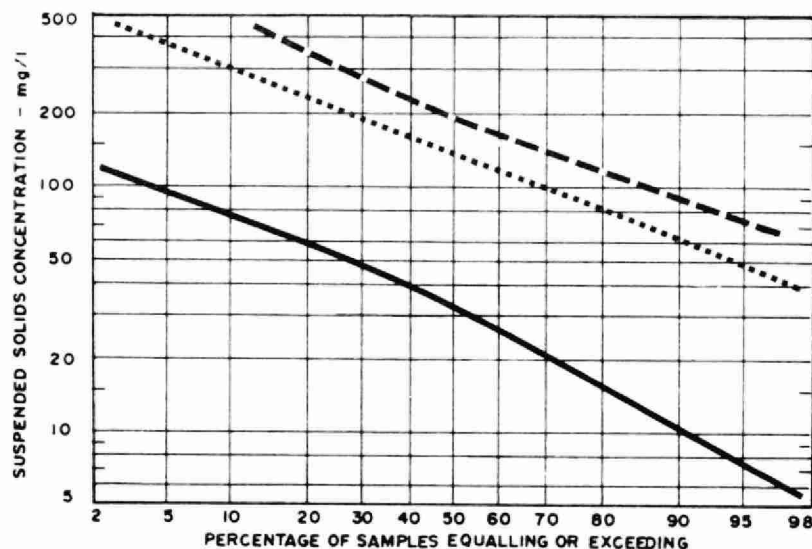
PLANT PERFORMANCE




MONTH	FLOWS			BIOCHEMICAL OXYGEN DEMAND				SUSPENDED SOLIDS				PHOSPHORUS	
	TOTAL FLOW	AVERAGE DAY	MAXIMUM DAY	INFLUENT	EFFLUENT	REDUCTION		INFLUENT	EFFLUENT	REDUCTION		INFLUENT	EFFLUENT
	million gallons	mil. gal	mgd	mg/l	mg/l	%	10 ⁶ pounds	mg/l	mg/l	%	10 ⁶ pounds	mg/l P	mg/l P
JAN	138	4.4	5.4	199	24	88	.24	448	41	91	.56	15.0	1.9
FEB	131	4.5	4.8	212	35	83	.23	440	60	86	.50	8.4	1.1
MAR	150	4.8	6.4	178	32	82	.22	303	37	88	.40	7.6	.4
APR	228	7.6	11.7	56	27	52	.07	118	45	62	.17	2.3	2.1
MAY	192	6.2	8.4	91	24	74	.13	177	38	78	.27	4.4	5.6
JUNE	144	4.8	6.3	133	27	80	.15	217	47	78	.24	29.0	9.0
JULY	149	4.8	7.3	148	19	87	.19	310	20	94	.43	6.8	2.3
AUG	161	5.2	9.0	131	22	83	.18	243	22	91	.35	8.1	2.6
SEPT	129	4.3	5.7	115	30	74	.11	140	28	80	.14		
OCT	138	4.4	5.8	141	29	79	.15	256	34	87	.30	11.0	2.1
NOV	158	5.3	6.0	114	27	76	.14	232	47	80	.29	6.5	2.1
DEC	147	4.8	5.1	109	16	85	.14	207	33	84	.26		
TOTAL	1865	-	-	-	-	-	1.95	-	-	-	3.91	-	-
AVG.		5.1	MAXIMUM 11.7	138	26	81	.16	265	38	86	.32	9.6	2.8
No. of Samples	-	-	-	133	133	-	-	242	241	-	-	15	15

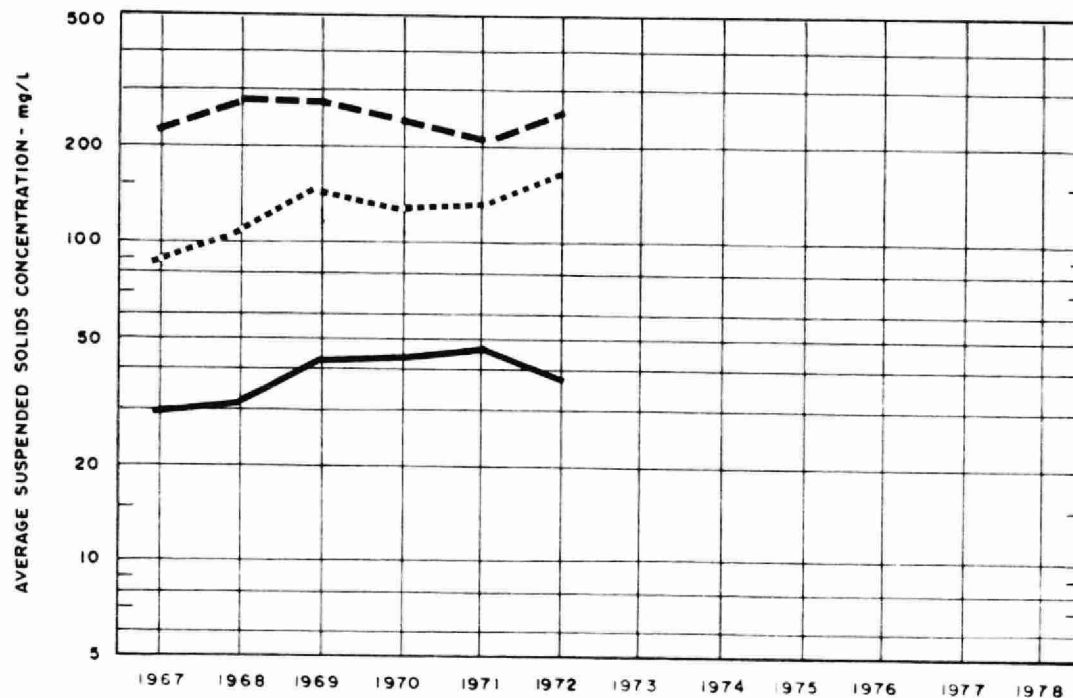
BIOCHEMICAL OXYGEN DEMAND



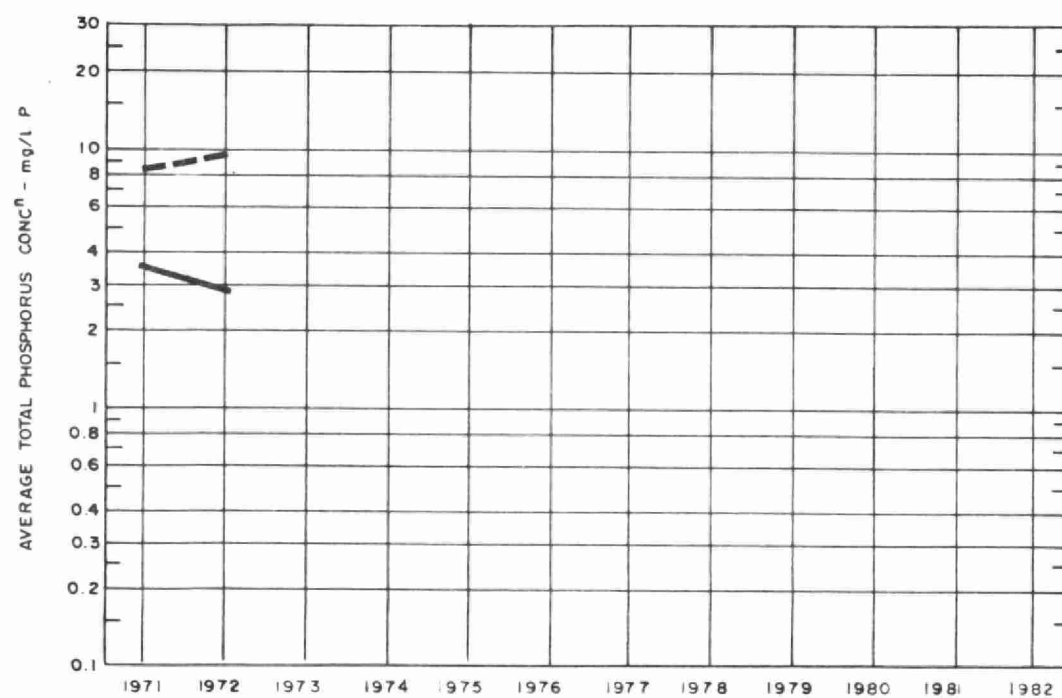
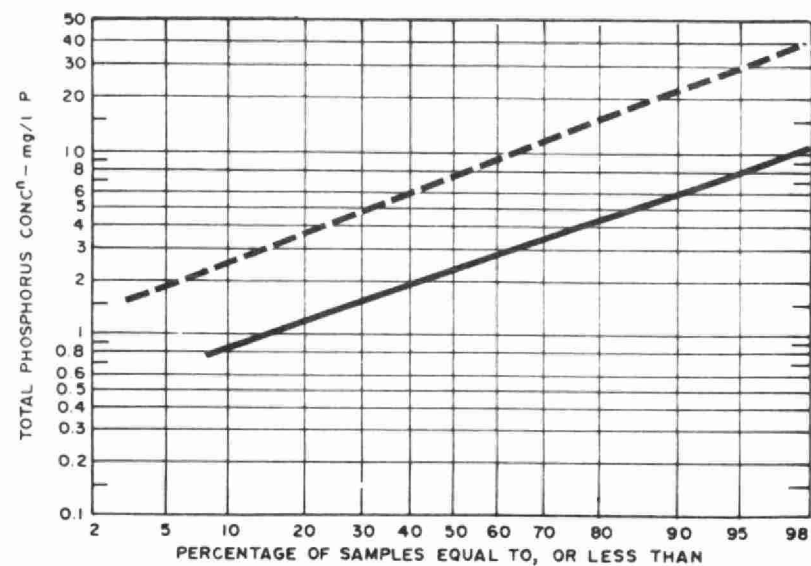
SUSPENDED SOLIDS



PLANT INFLUENT 
 PRIMARY EFFLUENT 
 PLANT EFFLUENT 



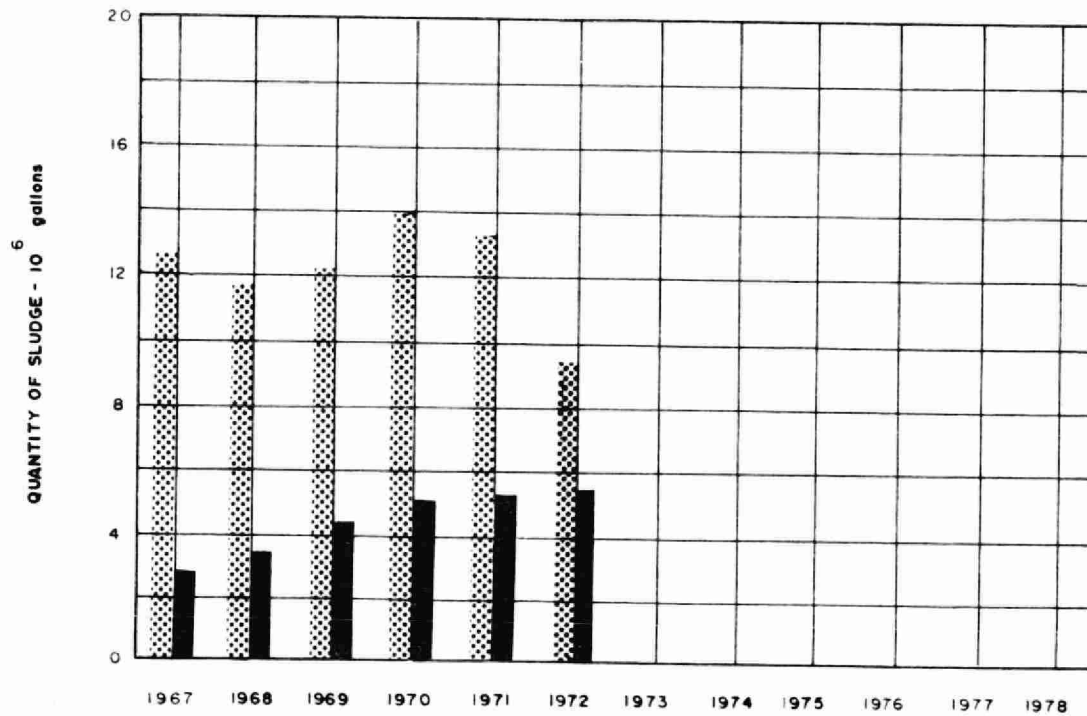
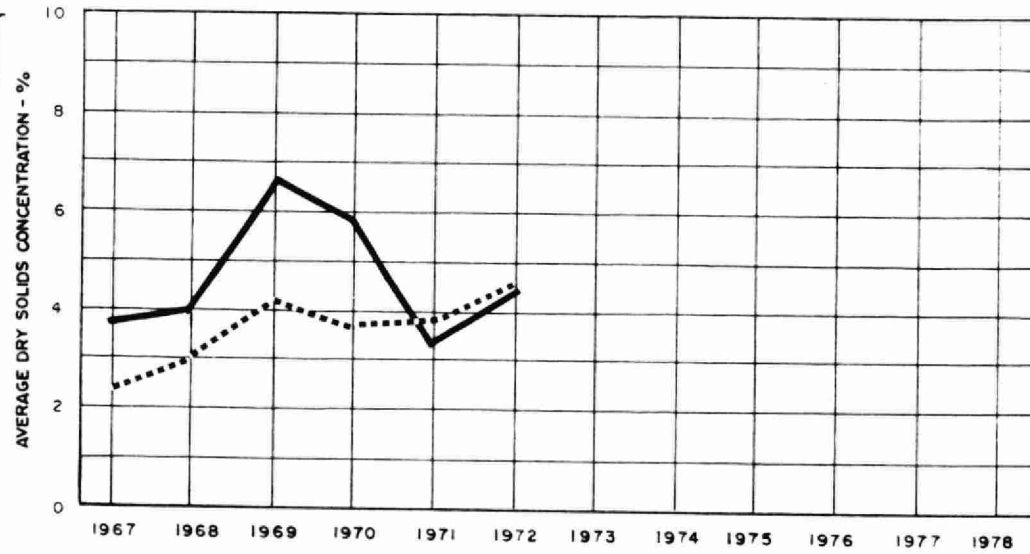
PHOSPHORUS



PLANT INFLUENT - - - - -
 PLANT EFFLUENT —————

DIGESTION

RAW SLUDGE
DIGESTED SLUDGE ———



RAW SLUDGE TO DIGESTER
DIGESTED SLUDGE REMOVED ———

TREATMENT DATA

MONTH	GRIT	CHLORINATION		PRIMARY EFFLUENT		AERATION			SLUDGE DIGESTION and DISPOSAL							
	QUANTITY REMOVED cubic feet	CL ₂ USED 10 ³ pounds	AVG. DOSE mg/l	BOD mg/l	SUSPENDED SOLIDS mg/l	MLSS CONC mg/l	F/M day ⁻¹	AIR 1000 ft ³ lb BOD	RAW SLUDGE			DIGESTED SLUDGE			SUPER- NATANT T. S. %	AMOUNT HAULED cubic yards
									QUANTITY 5 10 gallons	TOTAL SOLIDS %	VOL. SOLIDS %	QUANTITY 5 10 gallons	TOTAL SOLIDS %	VOL. SOLIDS %		
JAN	1596			103	88	1900	.21	2.5	10.8	3.7	72	5.7	4.0	66	2.0	3386
FEB	1596			133	126	1800	.30	2.0	7.5	3.8	70	7.4	4.8	69	1.9	4362
MAR	1486			98	89	2200	.20	2.2	5.7	4.7	68	9.0	5.4	67	.4	5374
APR	1596			51	92	2100	.17	3.4	6.8	5.7	52	3.2	3.7	58	.3	1893
MAY	1482			66	105	2100	.18	2.2	13.2	4.0	67	3.6	5.1	64	1.0	2129
JUNE	1254			88	117	2500	.15	2.6	11.4	4.6	64	2.3	4.5	66	.3	1352
JULY	1658			102	165	2100	.21	2.1	9.4	5.3	58	2.1	5.4	58	.6	1251
AUG	2176			131	200	1800	.35	1.5	3.3	4.5	63	4.1	3.7	60	2.0	2452
SEPT	1368			156	175	1300	.45	1.6	1.1	5.8	47	3.5	6.0	57	5.8	2092
OCT	1264			168	384	2300	.29	1.8	10.8	3.7	60	6.3	4.2	55	3.5	3752
NOV	1596			116	300	2400	.23	1.6	6.8	4.0	61	4.6	3.4	56	2.4	2704
DEC	1482			91	154	1400	.28	1.4	5.6	5.0	66	3.8	3.5	56	2.7	2265
TOTAL	18554	56	-	-	-	-	-	-	92.4	-	-	55.6	-	-	-	33012
AVG.	9.9 cu. ft./mil gal	4.7	3.0	109	166	2000	.25	2.1	1.2	4.6	62	4.6	4.5	61	1.9	2751



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